TITLE: BIOMONITORING METHODS FOR TOXINS

MILESTONE SHC 2.5.2: Transfer technology, tools, and knowledge related to harmful algal bloom events to assist communities, resource managers, and health officials.

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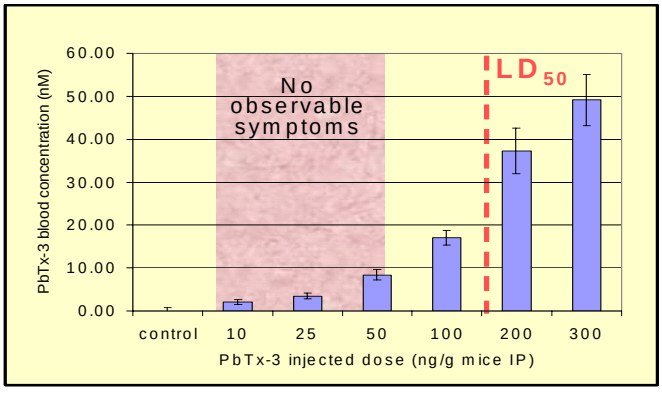
EXTERNAL COLLABORATORS: Centers for Disease Control and Prevention, Fundacion Cienica para lo Vida (Chile), AgResearch Limited (New Zealand), University of Utah, Yale University

OBJECTIVES OF RESEARCH ACTIVITIES: Develop and implement methods for biomonitoring of marine animals for the presence of HAB toxins with new generation rapid assays for all biotoxin classes.

DESCRIPTION OF RESEARCH ACTIVITIES: The need for definitive toxin identification in unusual mortality events associated with harmful algal blooms is increasing. However, the relationship between exposure to toxins in the environment and adverse effects in wildlife is poorly defined. This is because our knowledge of the amount of toxin (effect level) that causes adverse effects in animals or in humans is incomplete. Accordingly, health officials cannot determine the seriousness of harmful algal bloom incidents without accurate human or animal exposure information. Direct measurement of toxins in human or animal tissue (biomonitoring) provides a means to identify toxins in living animals in order to assess exposure. This project evaluates a blood collection card-based method that we have adapted from a technique employed by the Centers for Disease Control and Prevention for routine diagnostic and genetic testing of newborns. Blood is collected and applied to a ½ inch diameter circle on a specially designed blood collection card and allowed to dry. The blood spots are then extracted and screened for the presence of toxin using a high throughput biological assay. Positive samples are then examined for specific toxin congeners by liquid chromatography-tandem mass spectrometry.

Graphic/Image/Figures



Field application of blood collection cards (left) and detection of brevetoxin in blood of exposed animals (refer to publication by Melo et al.)

Selected Highlights

New studies were conducted in 2002 to examine the effects of red tides on aquatic species. Using locally caught striped mullet, animals were exposed in the laboratory to the red tide dinoflagellete, *Karenia brevis*. Blood was transferred to collection cards and the red tide toxin brevetoxin was measured in the using a newly designed radiommunoassay. Studies in the next year will continue to use this approach to determine how long the toxin remains in aquatic species upon entering and leaving areas containing red tides and what levels of the toxin are toxic to aquatic species.

Publications/Reports:

Woofter, R., M-Yasmine Bottein Dechraoui, Peter D.R. Moeller, Ian Garthwaite, José Córdova and Measurement of Brevetoxin Levels by Radioimmunoassay of Blood Collection Cards After Acute, Long-Term and Low Dose Exposure in Mice. (in house review)

Presentations:

Fairey, E.R. Design of Cell Based Biosensors with Defined Receptors and Response Elements. 21th Annual Meeting of the Society of Environmental Toxicology and Chemistry, 2001. Baltimore, MD

Bottein, M-Yasmine, Stacie M. Dover, Ricky Woofter, Thierry Work, George H. Balazs, Peter D. R. Moeller, and John S. Ramsdell. Detection and quantification of marine toxin exposure using blood collection cards. Xth International Conference on Harmful Algae, 2002. St. Petersburg, FL

Woofter, R, M-Yasmine Bottein Dechraoui, Peter D.R. Moeller, Ian Garthwaite, José Córdova and John S. Ramsdell. Comparison of receptor and immunoassays for brevetoxin detection in the blood of exposed animals. Xth International Conference on Harmful Algae, 2002. St. Petersburg, FL